DOCUMENT RESUME

ED 038 179 PS 003 148

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TITLE	Early Infant Stimulation and Motor Development.
INSTITUTION	Illinois State Dept. of Mental Health.
PUB DATE	Dec 69
NOTE	16p.
EDRS PRICE	EDRS Price MF-$0.25 HC-$0.90
DESCRIPTORS	*Developmental Tasks, *Infants, *Motor Development, Perceptual Motor Coordination, Perceptual Motor Learning, Physical Development, Positive Reinforcement, *Retarded Children, Skill Development, *Training Techniques, Visual Stimuli

ABSTRACT

Professional workers can assist parents of retarded infants by (1) helping them to recognize and cope with their feelings of guilt and despair, and (2) establishing a home program of exercises to allay the infant's inertia. Such exercises have been demonstrated by numerous investigators to be of positive value in improvement of motor performance. This paper gives the interventionist and parent a tool for determining the infant's functional level, using the principle that maturation proceeds in a cephalocaudal direction. The child is to be rated on a list of motor skills related to head control and to locomotion. Using this assessment as a basis, and with the physician's approval, the interventionist can suggest stimulation exercises for the child which will help him to learn to perform physical tasks, in sequence and over a period of time. Detailed instructions and diagrams are given for helping the child to attain 18 motor skills, which range from raising the head to walking unaided. The verbal response of the parent, both in providing direction and in showing pleasure and praise, is of crucial importance to the success of the retarded child in performing these programmed exercises. (NH)

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EARLY INFANT STIMULATION

and

MOTOR DEVELOPMENT

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"You have a retarded infant; take him home and love him" is the advice physicians offer to parents of a retarded infant. And, as suggested, the parents take him home and they love him. But as the weeks and months go by they become frustrated. They have waited for their child to respond - to smile, to laugh, to roll over, to do anything to indicate that he is aware of his surroundings. But he hasn't. Instead he lies in his crib blankly staring or flaccidly moving about.

A cycle of infant inactivity and parental silence is developing which will become more firmly entrenched into the life of this family as the months go by. The infant continues to be in his crib giving little indication that he is aware of his environment. As he grows older his lack of development becomes increasingly apparent. Well intentioned neighbors, relatives and friends ask, "Shouldn't Johnny be sitting - he's almost nine months old?" The parents angerly agree. They experience and express a gamut of emotions - denial, withdrawal, rejection, and guilt. The months of waiting and hoping are finally taking their toll. Frustration turns to despair. Silence is ultimate. The cycle is complete.

The challenge to the professional in assisting the parents to break this cycle is two-fold. First, she must assist the parents in recognizing and coping with their own feelings and emotions. She must help them understand their problems without adopting the problems as her own. Patterson has said "Only as we parents are helped to work through our problems can we find any peace of mind. If we have not planned for our child ourselves... we may never be at peace with the solution which was reached for us."1

A second challenge to the professional is to establish a concrete program to allay the child's inertia. But if there is no active behavior - if the child can't raise his head, roll over to sit - how can one help to develop these behaviors? In other words, how can one stimulate a child to learn? And when and at what point should one begin? Most importantly, will stimulation obtain or change a behavior?

According to a growing number of studies, environmental stimulation does change behavior. In a study by Gerber in Uganda, Africa, infants demonstrated an all round superiority in motor development during the first year of life. Before weaning, the Uganda infant is constantly with his mother, she plays with him and encourages him to perform certain tasks. However, after weaning he is expected to be independent and is therefore given less stimulation and encouragement. As a result there is a marked decrease in motor development.[2] Burton White (1966) found that by manipulating objects and conditions near infants the rate of development can be accelerated.[3] Murphy, in her studies at the Menninger Foundation, found positive correlations between the mother's talking to the baby and the baby's vocalization and his later IQ.[4] Rose C. Engle further substantiates this in Language Motivating Experiences for Young Children. She states that a "non-verbal environment breeds language-deficient children, and children with impoverished language backgrounds are high risk failures..."[5]

Les Cohen, Assistant Professor of Psychology at the University of Illinois, maintains that stimulation should begin as soon as the child is brought home from the hospital. He reported research indicating that infants can see clearly if objects are at a distance of 9 inches (after 3-4 months of age infants can better accommodate their vision).[6] Dr. Cohen found, too, that infants are more fascinated by pictures, mobiles, etc., when the color contrasts are quite evident,

e.g., black and white, red and white, etc. In an extremely young infant the design of the mobile or pictures should be kept fairly simple and need not be changed. However, as the infant reaches 3-4 months of age, the stimuli can become more complex and novel.[7] The difficulty with many mobiles are that they are designed to look beautiful from the side. But in reality an infant in the lying position sees only the edges and derives very little stimulation.[8] A test to determine which stimuli are coming to the child would be to lie on one's back and view the mobile hung over the head. Thus mobiles should be hung to face the infant at a distance of no more than 9 inches. Generally, the same principles apply if pictures are to be hung.

Other methods of stimulation include moving the crib about in the room, attending to the infant from alternating sides of the crib, fastening bells on his shoes, bicycling his legs each time his diaper is changed. Expose the infant to as many new situations as possible - carry him from room to room, identify various objects for him, urge him to feel various textures. Above all, talk to him, cuddle him, smile and laugh at him. Sing to him, tickle him, play peek-a-boo with him, "rough house" with him. (Hunt has found a positive correlation between frequent body contact and motor skills).[9] Move his face so that he looks at you, say "good boy for looking" immediately upon his looking at you. Extend this principle of immediate praise to include other behaviors you want. Specifically, to be maximally effective, affection must <u>immediately</u> follow a desired behavior, e.g., "good boy for sitting" or "you're standing all by yourself - that's very good." Such an approach helps the child better discriminate what is expected of him and he can therefore learn more easily.

The purpose of this paper is to provide the interventionist and parent with a tool to assess an infant's functional level. The tool is set-up to apply the principle that maturation proceeds in a cephalocaudal direction, i.e., control first occurs in the head area, then the arms and upper trunk, afterwards in the lower trunk and finally in the legs and feet.[10] Those who use the tool should observe the child and note what he can and cannot do according to the guidelines offered below.

To improve motor performance in a given area refer to the specific page number indicated in parenthesis; e.g., if a child cannot lift his head when placed on his abdomen,. refer to page 3.

TOOL FOR THE ASSESSMENT OF MOTOR SKILLS

+ = Present
± = Fluctuating
0 = Not present

HEAD CONTROL

____ 1. Lifts head when placed on abdomen. (3)
____ 2. Lifts head and supports weight on arms (elbows bent) when placed on abdomen. (4)
____ 3. Head held steady while being pulled to a sitting position. (5)
____ 4. Lifts head and supports weight on hands (arms straight). (5-6)

LOCOMATION

____ 1. Rolling (back to stomach). (6)
____ 2. Rolling (stomach to back). (7)
____ 3. Sitting - observe for equilibrium reactions, i.e., if child when placed in sitting position extends her arms to maintain her balance. (7-8)

____ 4. Sitting - leans forward on hands. (7-8)
____ 5. Creeping (stomach on ground) using reciprocal pattern (alternating movements of arms and legs). (8)
____ 6. Rocks back and forth on all fours. (9)
____ 7. Creeps reciprocally (alternating movement of arms and legs). (9-10)
____ 8. Bounces and takes a fraction of own weight when supported in a standing position. (10)
____ 9. Pulls to feet. (11)
____10. Stands momentarily unsupported (11-12)
____11. Walks while two hands are held (12)
____12. Walks while holding one hand (12)
____13. Walks alone. (13)

Once the interventionist has ascertained the child's motor abilities, she should secure approval from the physician to suggest various stimulation exercises for the child. In designing this home program she should look at "where the child is" and use this as a pivotal point to improve motor performance.

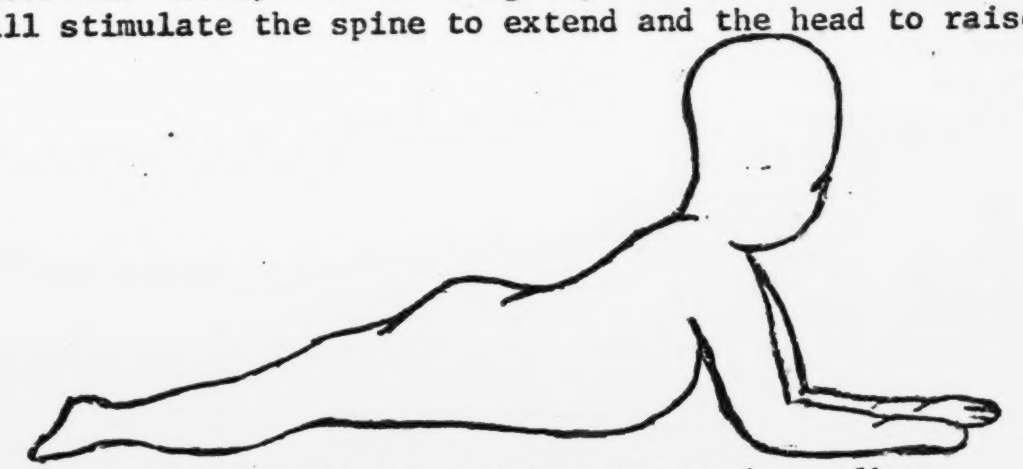
The following steps are offered to help the <u>infant raise his head</u>. The pictures at the end of each completed procedure serve as a model of how the child should appear before he goes on to the next series of procedures.

1. Place the infant in a prone position on a hard surface.
2. Offer the infant an opportunity to lift his head. In other words stimulate him - call him by name, shake a rattle or other noise making toys above his head. Shake the rattle in such a position that if he wants to identify the source of the sound he will have to pick his head up. Initially reinforce (hug, kiss, smile - become excited and let the child know you are pleased) any effort made by the child to lift his head. Gradually, however, expect more from the child and withhold your praise until he does so. This can be a long and arduous task both for the mother and the infant so offer much encouragement and support to the mother. Remind her that this is a stepping-stone to other motor activities, such as sitting, crawling and standing.
3. The infant has achieved this task when he can lift his head and hold it up for one minute.

Lifts head when placed on stomach

Steps to achieve lifting of head with weight supported on elbows.

1. Infant is placed on his abdomen on the floor.
2. Place a blanket roll under the chest (the size of the roll should be such that when it is in place the child's elbows and lower arms rest on the floor). The use of the blanket roll not only strengthens the neck muscles but also makes the trunk and shoulder muscles stronger.
3. Now that the child is supporting much of his weight on his elbows place a toy near which the child can see, feel or move. The child may also enjoy looking at himself in a mirror.
4. Play with the child - call him by name, hang objects, ring bells, etc., anything that will make him pick his head up.
5. Again reinforce (sing, clap, kiss or hug the child) for any effort the child makes to lift his head. Gradually though, demand more effort from the child before you show you are pleased.
6. Place the child on his abdomen on the floor (without a blanket roll under his chest). Exert slight pressure on the sacrum (tail bone). This will stimulate the spine to extend and the head to raise.11



Lifts head with weight supported on elbows

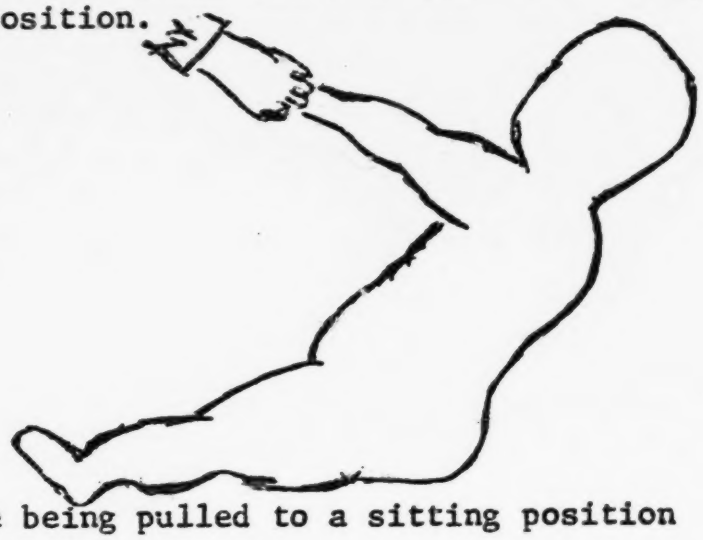
If the child has progressed to this point it is now necessary to consider procedures to facilitate unclenching of the child's fists. This step is necessary before the child can support his weight on his hands. The steps to facilitate unclenching of fists are as follows:

1. With the child supported either on your lap or in a prone (face down) position on the floor gently massage the closed fist (massage in a direction away from the knuckles) until the fisted hand begins to relax. Straighten out the hand and rest it on an even surface for a few seconds.
2. This same procedure can be repeated in the water, e.g., during bath time. Warm water tends to relax the child and opening the hand becomes less difficult.
3. Place a wash cloth or small toy in each hand 20-30 minutes each day.
4. At this point when picking up the child encourage a more open-handed position by inserting your middle and index fingers into the child's fists and gently pull him to a sitting position, then gather him up into your arms. Talk to him - encourage him to reach. Extend your arms to him so that he can imitiate you. Again initially accept any open handed reach but begin to demand more from the child.
5. This same procedure can be repeated by placing your thumbs in the child's hands and simultaneously bringing his arms to a midline position. Also with your thumbs in his hands bring his hands to his eyes - play "peek-a-boo." Always express pleasure when a child

attempts a task you want (in this case opening his hands) and verbalize this pleasure to him. Now that the child assumes for the most part an open handed position a second consideration is necessary before the child is ready to support his weight on his hands when in a prone position. The child's arms and upper trunk still need to be strengthened. The following procedures tend to do this plus they also enable him to hold his head steady while he is pulled to a sitting position:

1. With your thumbs resting in the child's hand and fingers around lower arm pull him to a sitting position. Then bring the child's fists under his chin and gently push to raise the head.[12] Again let the child know you are pleased when he raises his head.
2. With the child in a sitting position on your lap and facing you, gently grasp the child's arms, raise them up above his head and slightly away from his body. This automatically encourages the child to lift his head.[13]
3. Again with the child sitting on your lap facing you, grasp the child's hands and gently move his arms (at shoulder level) slightly behind his body. Make certain the child's elbows are kept straight.[14]

Repeat these procedures until the child can hold his head steady while being pulled to a sitting position.



Head held steady while being pulled to a sitting position

The child is now ready to begin preparation to <u>support his weight on his hands when he is placed in a prone (face down) position</u>. The procedures below will assist the child to do this.

1. Place the child in a prone (face down) position on the floor.
2. Place a blanket roll under the child's chest. (The blanket roll should be of such a size where the child is <u>unable</u> to rest his elbows on the floor).
3. Place the child's hands flat on the floor in front of him.
4. Encourage the child to support his weight on his hands - again use a rattle or noise making toy and hold it above and slightly behind his head so that he will need to raise up on his hands and look in order to better identify the source of the sound.
5. If the blanket roll is cumbersome, place the child in a prone position on the floor with a diaper under his chest. Straddle him and lift his chest off the floor with the diaper to the point where his arms are straight and his hands are resting on the floor. Allow him gradually to assume more weight on his hands.

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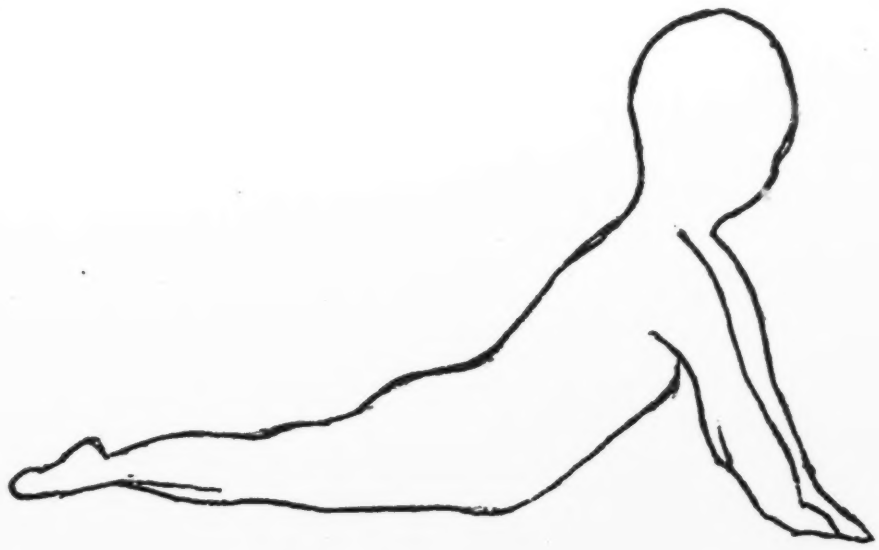
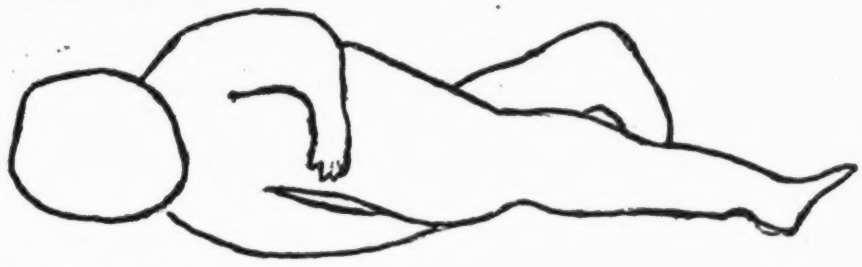
6. Play "airplane" with him to develop his parachute responses (normally seen at 12 months and which must be developed before the child can walk). Hold the infant in the air and plunge him toward (but not hitting) a hard surface face down. Observe to see if he extends his arms as if to catch himself (parachute response). Work first for extension of arms which may take several weeks. Then when this has developed, play "airplane" with the child and allow his hands to touch the hard surface. Again gradually allow him to assume more weight on his hands.



Lifts head and supports weight on hands (arms straight)

Once the child is able to support his weight on his hands while in the prone position it is time to consider preparatory steps toward locomation. The first of these is <u>rolling from back to stomach</u>. In order to teach the child to do so consider the following procedures.

1. Place the child on his <u>right side</u> on the floor. Then move his right leg forward over his left[14] Encourage the child to roll over on his stomach. At first you may actually need to roll the child yourself, but gradually reduce your assistance. When the child is able to turn from his side to his stomach, place him on his back, and with your hand resting in the small of his back, gently urge him to roll over. Make sure his head is turned toward the direction he is rolling as this will better facilitate rolling.
2. Repeat the same procedure with the child on his left side. In both of these procedures you may use a rattle shaking it so that the child has a stimulus to work toward.



Rolling - back to stomach

In all cases, even if the success is small, become excited and show that excitement to the child. Again gradually expect more from the child and withhold your praise until he does so.

The following procedures will enable the child to <u>roll from his stomach to his back</u>. Practice these in conjunction with the above mentioned procedures.

1. Place the child on his stomach on the floor. Kneel beside him. Gently lift one of his arms, bend his elbow and rest his palm flat on the floor. Tuck the other arm under him. Make sure his head is turned toward the side of his bent arm. Urge him to push himself over onto his back using his hand that is flat on the floor. Again initially you will probably show him what you want by placing one hand on his (the hand that is flat on the floor). Insert your other hand under the child and roll the child over. While you are doing this, say "push yourself over" or something similar so that the child knows what you want. Repeat the same procedure with the child's other arm bent so that the child becomes equally proficient with rolling over, pushing with either arm.

Rolling (stomach to back)

Once the child has become fairly proficient at rolling over, i.e., from back to stomach, and stomach to back, it is time to consider preparations for sitting. The following suggestions might prove beneficial in this area.

1. Place the child in an infant seat 30 minutes daily. Note the notch increments on the infant seat and adjust them so that the child <u>gradually</u> goes from a lying to a sitting position, i.e., this is to occur over a period of weeks so that the child can gradually become accustomed to sitting in an infant seat. In this position move the child from room to room. Talk to him, allow him to watch you while you are working.
2. Place the child on a hard surface (floor or play pen) daily for 15 minutes on his back and 15 minutes on his stomach. LeLouis found this procedure necessary to establish sitting.[16]
3. Since balance is essential to sitting it must be developed. This can be attained by sitting the child on the floor, kneeling beside him and gently rocking him from side to side. Observe to see if the child attempts to catch himself with an out-stretched arm and hand to the floor. This is what you are working toward,but intitially as you are rocking the child, you may need to move his arm and hand to the floor. Initially this <u>may</u> require two people to execute this procedure. Remember that the child will need to maintain balance before he can sit unsupported.
4. With the child on his back, make him touch and play with his feet. This not only strengthens the lower trunk muscles, but it will help him feel and appreciate his legs and feet. The latter is important in the development of body awareness and later in standing and walking.[17]

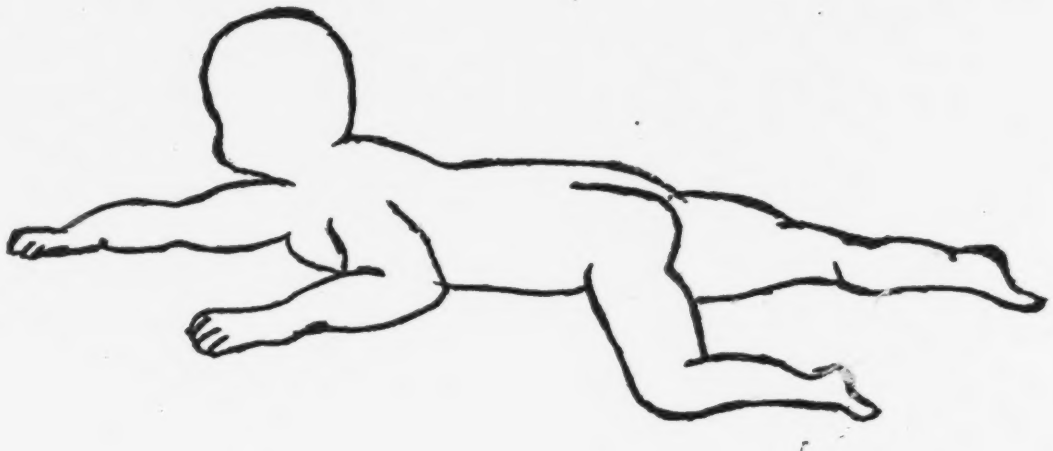
5. Place the child in a sitting position on the floor. He should be sitting with a wide base, i.e. with his legs apart, knees bent and hands resting on his feet. Support the child in this position for a few minutes being careful not to let the child fall. In this instance the mother should probably be kneeling behind the child.
6. When the child is sitting fairly well but still needs support, place him in a jump seat for short periods of time during the day.

   Make certain his <u>feet</u> are resting solidly on a <u>flat surface</u>. Encourage him to bounce up and down, pushing with his feet - first by pushing the seat yourself. Smile at him and praise him for pushing. Gradually reduce your assistance, but continue to praise him for this behavior. Repeat these procedures until the child can sit as indicated in the picture below.

Sitting... leans forward on hands

Along with the procedures necessary to sitting, work with the child to develop <u>a creeping pattern with stomach on ground</u>. The following suggestions might prove beneficial.

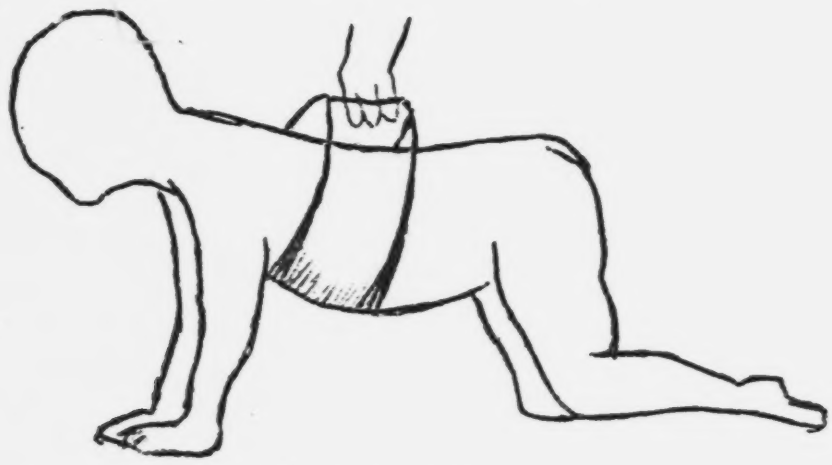
1. Place the child on his abdomen on the floor with a favorite toy in front of him but just out of reach. Kneel behind him and urge him to move forward. Initially, this procedure may require the assistance of two people - one to kneel behind the infant and one to kneel in front of him. Both people involved should move the child's arms and legs in a reciprocal pattern and urge him to move forward. Always talk to the child, let him know what you want, and praise him for each small accomplishment.



Creeping (stomach on ground) with reciprocal (alternating movements of arms and legs)

Continue to practice the sitting and creeping procedures until the child becomes fairly adept at both. At this point then,he is ready to begin steps toward raising up on all fours and rocking back and forth. The following steps are offered to develop this behavior.

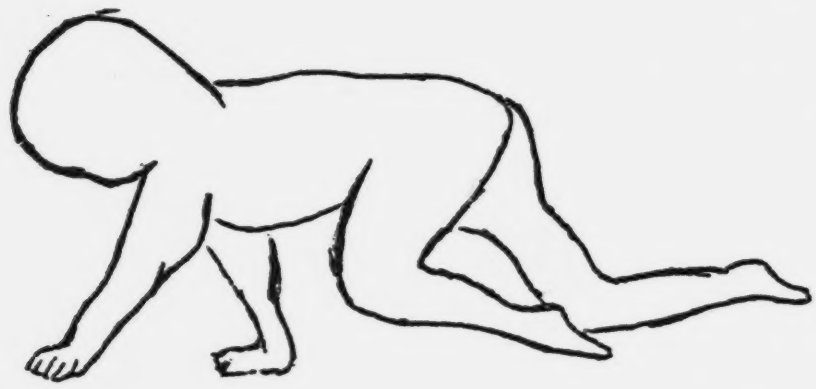
1. Place child on his stomach on the floor. Insert diaper under his chest, straddle him and gently pull on diaper until the child is up on all fours. Hold the child in this position for a few minutes,then rock him back and forth. Again talk to the child - tell him what you want although it is you who are initiating the activity. Express pleasure with each small accomplishment. Gradually reduce your assistance. Practice this until the child is adept at rocking back and forth on all fours unassisted.



On all fours. Rocks back and forth

Once the child is able to support his entire weight on all fours, he is ready to begin practice toward reciprocal creeping. The following suggestions should prove beneficial.

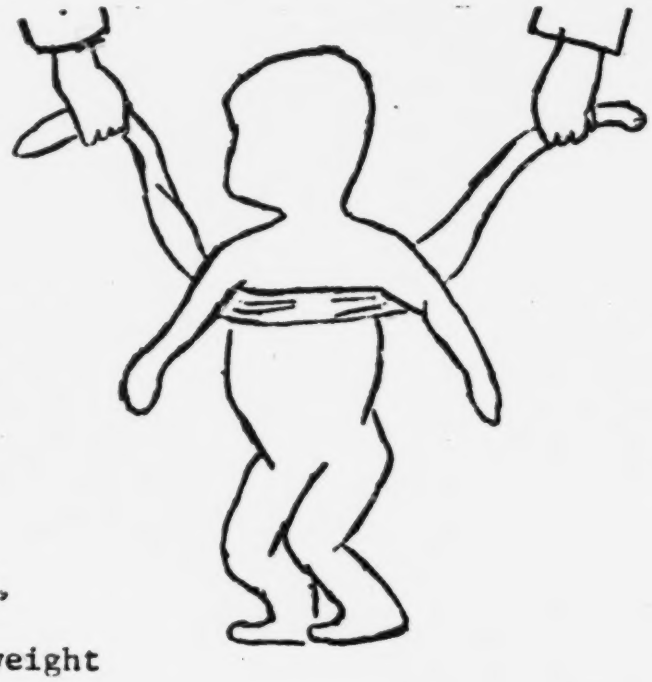
1. Perform this procedure with the child on all fours and with the assistance of two people (one in front of the child and one behind). Move the child's legs and arms in a reciprocal motion, i.e., move right arm forward then push left leg forward, left arm forward, then right leg forward. (In moving the legs forward first exert slight downward pressure against each foot). After a time this pressure alone will cause the child to move his legs forward. Always indicate verbally to the child what you expect from him and break each task into small steps, e.g., say to the child as you are assisting him "move your hand (then you move it and say "good"), "now move your leg" (again say "good").
2. Once the child has become proficient at moving his arms forward, the assistant who was working in front of the child may be withdrawn. Instead, place a favorite toy in front of the child (but out of reach) and urge him to work toward it. At this point someone may still need to move the child's legs.
3. If the child doesn't seem to be particularly interested in toys, a favorite food may be substituted as a token for desired behavior. Initially, offer food for each small accomplishment, but pair it with social praise, i.e., a touch, a hug, a verbal acknowledgement of the child's accomplishment. Later, the child will learn the rewards of creeping, and artifical rewards (food) can be withdrawn.



Creeps reciprocally

When the child can creep reciprocally, begin the following procedures to promote standing supported.

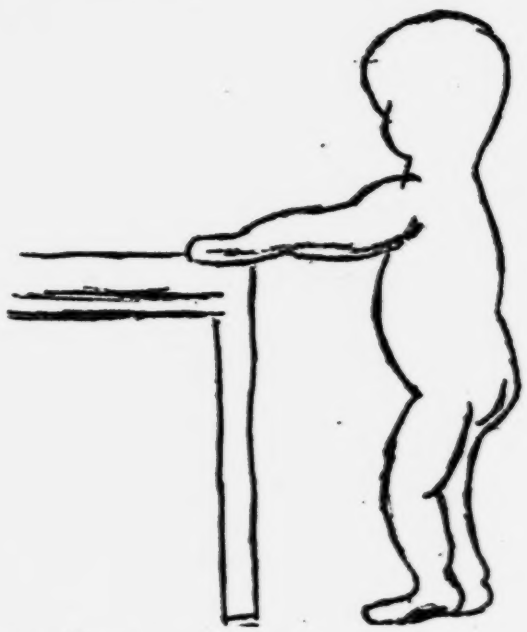
1. Place the child over a partially inflated plastic beach ball. Gently roll the ball and child back and forth. This will encourage him to balance himself with his feet and hands.[18]
2. Place the child in an "all fours" position on the floor. Kneel behind the child assuming a position close enough to the child so that your knees are supporting her lower legs. Place a diaper across her abdomen. Tug gently on the diaper and urge the child to come to a kneeling position.[19]
3. Place a large blanket roll on the floor. Sit the child so that he straddles the roll. Kneel at one end of the roll and move the roll gently from side to side.[20] Carefully protect the child so that he doesn't fall.
4. Place the infant in a jump seat with his feet resting flat on a hard surface. Urge him to bounce up and down.
5. Lower the child over an inflated plastic beach ball (child's abdomen is resting on the beach ball). Grasp the child's hands and raise them above his head and rest them on the beach ball. The second interventionist grasps the child's legs (at the knee) and makes sure the child's feet are resting firmly on the floor.[21] Hold this position for a few minutes.
6. Sit in a chair. Place the child in a sitting position so that his back is resting against your lower legs. Place a diaper around the child's chest. Gently tug on the diaper urging the child to a standing position. The picture below gives an indication of how the child will appear.



Standing balance,
bounces, takes
fraction of own weight

The child is now ready to begin procedures preparatory to <u>pulling himself to his feet.</u>

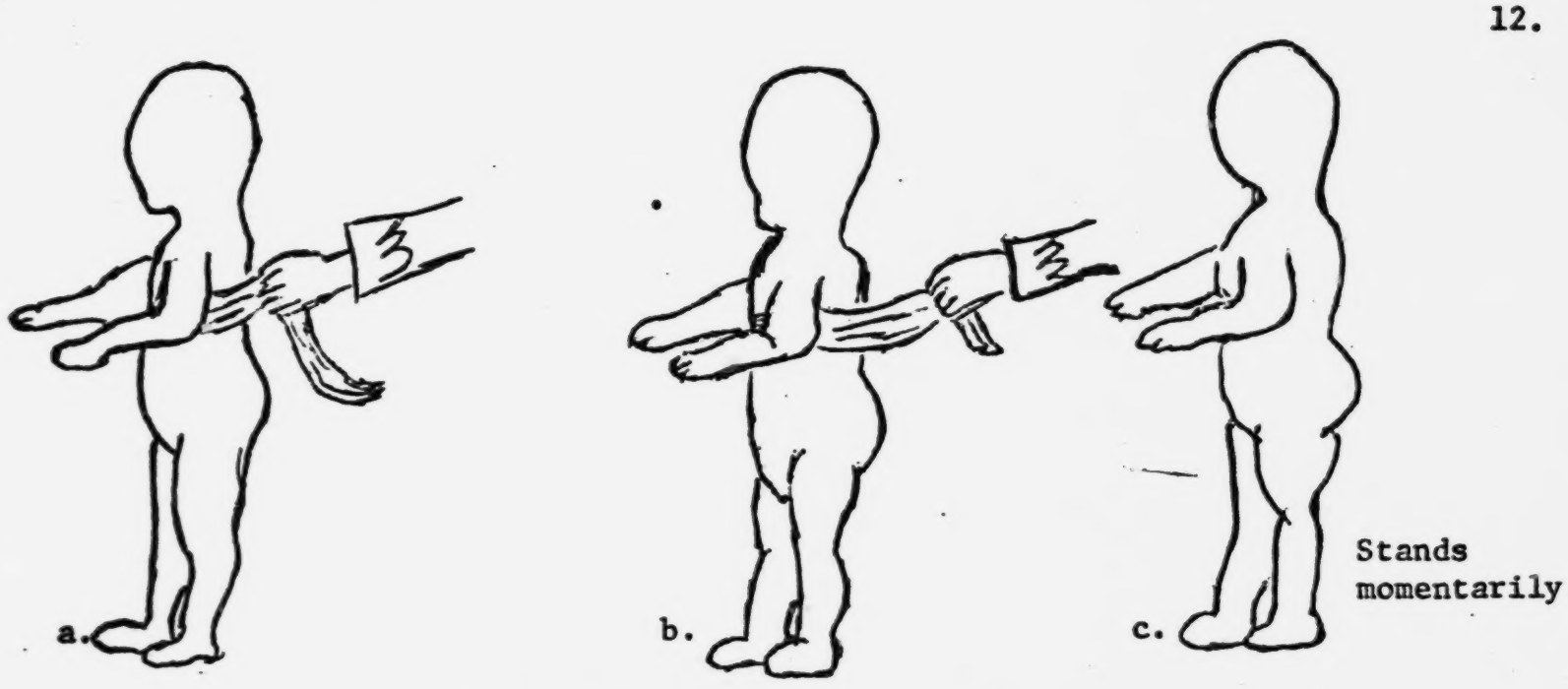
1. Kneel on the floor beside the sitting child. Move one of his arms (elbow straight) slightly behind him and rest his open hand on the floor. Urge him to partially support his weight on that hand and arm.
2. With the child now able to partially support his weight on one hand and arm in a sitting position urge him to reach up with his other hand. This might best be accomplished by offering him a toy or a small amount of his favorite food. Express pleasure along with a hug or kiss for any attempts made at reaching.
3. When the child has learned to reach with his free hand, bring it (the free hand) to rest on a hard surface such as the arm of a chair or table. Urge him to pull himself to a standing position. Say "pull" or something similar to let the child know what you want. Initially, you may need to assist the child to a standing position. Gradually reduce your assistance, but continue to praise each small accomplishment. Practice these procedures until the child resembles the picture below.



Pulls to feet

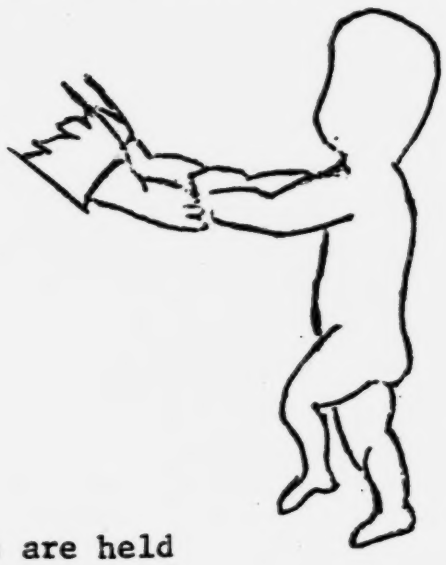
At this point the child is ready to begin steps toward <u>standing unsupported</u>.

1. Assume a standing position and stand the child in front of you. Allow him to support himself on your legs. (i.e., his back resting on your legs).
2. With the child in the same position, place a diaper around the child's chest. Grasp the diaper near the child's body and move slightly away from the child (as seen in the first picture on the following page). Again, express pleasure at any small attempt the child makes toward standing. As the child becomes steadier on his feet, continue to use the diaper around his chest, but grasp it at a distance further away from the child's body (as indicated by the second picture in the series on the following page). Gradually, over a period of sessions, reduce your assistance and finally remove the diaper. At this point, your child should be standing alone for a few seconds as indicated by the final picture.



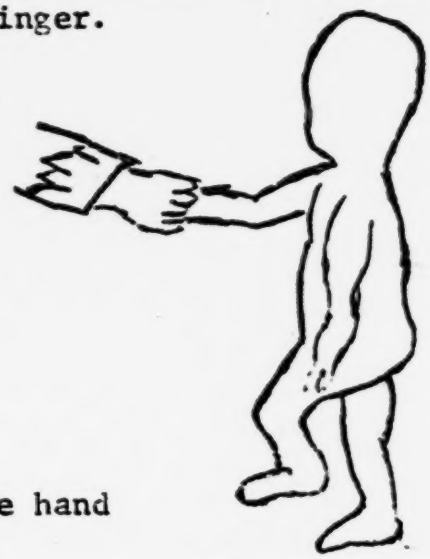
Now that the child is standing, it is time to begin steps toward <u>walking</u>.

1. Place the child in a standing position. Stand in front of him, grasp his two hands. Gently pull him forward. Note any stepping motions. If none are present the assistance of another person is needed to kneel behind the child and move his legs in a stepping motion. Although you have initiated the activity, express pleasure at the child's attempts no matter how small. The person behind the child should gradually reduce his assistance. At the end of this procedure the child should assume the appearance of the model below.



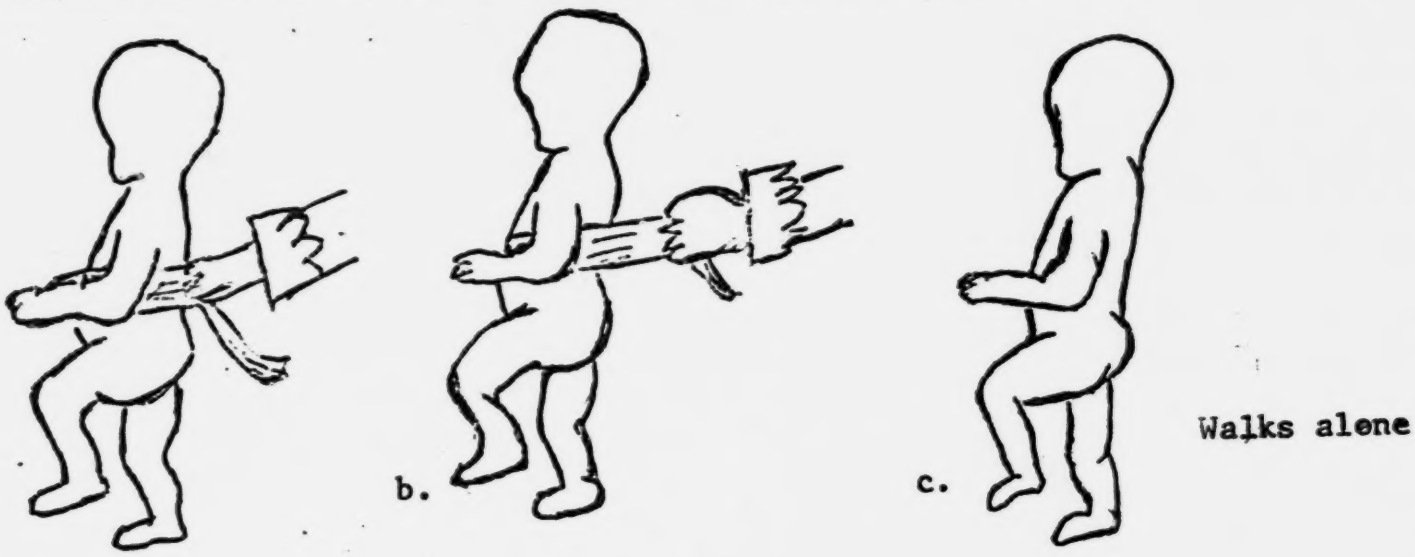
Walks while two hands are held

2. Work toward the child <u>walking while holding onto one hand</u> as indicated below. Do this by gradually reducing your assistance, i.e., initially put your whole hand over the child's hand, then your middle finger and thumb, then just one finger.



Walks while holding one hand

When the child has progressed to this point (walking while holding onto one hand) place him in a standing position. (This procedure requires the assistance of two people). One person should stand behind the child and place a diaper around the child's chest. Grasp it firmly and close to the child's body to offer him a maximum amount of security (indicated in the first picture below). The second person should stand in front of the child and offer him a favorite toy, etc. (hold it slightly away from the child so that he will need to take one or two steps to obtain it). Express much pleasure at each small accomplishment. Gradually make the child work harder, i.e., hold the toy further away from the child so that of necessity he will have to take more steps to reach it. Very gradually also loosen your grip on the diaper and grasp it further away from the child's body (as shown in the second picture). Again urge the child to walk. Practice this until the child has reached the point where he can walk unassisted as indicated in the final picture below.



THESE PROCEDURES ARE OFFERED TO THE PARENT AND INTERVENTIONIST TO ASSIST THE RETARDED CHILD. NUMEROUS INVESTIGATORS HAVE DEMONSTRATED THE POSITIVE VALUE OF EXERCISES AND POSITIONING. HOWEVER, IT IS EQUALLY IMPERATIVE TO REMEMBER THAT IN PERFORMING SPECIFICALLY PROGRAMMED EXERCISES, VERBAL RESPONSE BY THE PARENT IS CRUCIAL TO THE SUCCESS OF THE CHILD. ANY CHILD NEEDS TO BE DIRECTED, I.E., HE NEEDS BOTH VERBAL AND NON-VERBAL CUES TO SHOW HIM WHAT YOU EXPECT OF HIM. THE RETARDED CHILD, HOWEVER, NEEDS MORE. FIRST, HE MAY NOT INITIATE ACTIVITIES OR BEHAVIOR, SO HE NEEDS YOU AS A MODEL. SECOND, HE NEEDS YOU TO ACTUALLY PUT HIM THROUGH THE ACTIVITY. AND FINALLY, HE NEEDS YOUR SMILE, YOUR HUG, YOUR TONE OF VOICE TO SHOW HIM HE IS PERFORMING WELL. IT IS THIS STIMULATION FROM WHICH THE RETARDED CHILD WILL DEVELOP TO HIS FULLEST CAPABILITIES.

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